UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,634	10/29/2003	Nobuhiro Takeda	1232-5187	7331

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EXAMINER
HERNANDEZ, NELSON D

ART UNIT	PAPER NUMBER
2622	

NOTIFICATION DATE	DELIVERY MODE
11/17/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTOPatentCommunications@Morganfinnegan.com
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	Application No.	**Applicant(s)**
Office Action Summary	10/697,634	TAKEDA, NOBUHIRO
	Examiner	**Art Unit**
	Nelson D. Hernández Hernández	2622

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _30 July 2008_.
2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-10_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) _1-10_ is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on _23 October 2003_ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☒ All   b) ☐ Some * c) ☐ None of:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____.
      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1.   The Examiner acknowledges the amended claims filed on July 30, 2008. **Claim 1** has been amended.

Response to Arguments

2.   Applicant's arguments filed July 30, 2008 have been fully considered but they are not persuasive.

3.   The Applicant argues the following:

a.   "The Office Action repeats its contention that this deficiency is disclosed by Tetsuji which shows in Fig. 1 that optical signals are obtained by calculating output signals of an effective pixel area I, an optical black area II whose overall area is shielded from light, an optical black area III which has no light receiving portions with the overall area being shielded from light, and an optical black area IV which has no light receiving portions with the overall area having an area for the light receiving part opened to let the light hit said area. The Office Action further contends that "Tetsuji teaches that when in operation the signal of a pixel is corrected by subtracting the noises represented by signals of the areas II, III and IV, represented as VI, V?, and V3 respectively from the image signal of said pixel, said signal represented as V by using the equation $A = V - V_1 + V_2 - V_3$." [4/30/08 Office Action, p. 3-4].

Thus, the Office Action asserts that Tetsuji's area III corresponds to Applicant's first reference area where a pixel is "shielded from light and does not have a photoelectric conversion element" as recited in claim 1. Applicant notes, however, that Tetsuji's area III has a noise component represented by V2 which is *not subtracted* from the image signal V. The equation ($A = V - V_1 + V_2 - V_3$) as indicated above by the Office Action and provided by Tetsuji on p. 7 shows that the component V2 is actually *added* to the image signal V. Thus, irrespective of whether component V2 is applied to correct the signal with respect to each corresponding horizontal line, Tetsuji does not actually subtract the signal as required by Applicant's claim 1. Tetsuji therefore does not remedy deficiencies in AAPA and Shimoyama since Tetsuji fails to teach a first correction unit which corrects the effective pixel area by subtracting the first reference signal.

Accordingly, AAPA, Shimoyama, and Tetsuji - whether alone or in combination - fail to teach, disclose, or suggest a "first correction unit adapted to correct signals of the effective pixel area by subtracting the first reference signal with respect to each corresponding horizontal line" and that the second correction unit is "adapted to correct signals of the effective pixel area, which are corrected by said first correction unit, by evenly subtracting a representative value which is based on the second reference signal" as recited in Applicant's amended claim 1. Applicant respectfully submits that claim 1 is patentably distinct from AAPA, Shimoyama, and Tetsuji for at least this reason. Independent claim 9 incorporates the same limitations and, hence, is asserted to be patentably distinct for at least

similar reasons. Since claims 2-4 and 10 depend either directly or indirectly from claims 1 and 9, respectively, they are all allowable for the same additional independent reasons set forth with respect to claims 1 and 9. Accordingly, the Section 103 rejection of claims 1-4 and 9-10 should be withdrawn."

➢ The Examiner disagrees. The Examiner understands that in the Tetsuji reference, the signal V_2 appears to be added to the image signal, however, the equation is intended to subtract the undesirable signals present in the effective image sensing area to obtain only the image signal "A". The Examiner understands that the signal V_2 which corresponds to signals C + D + C2 (dark current of a vertical shift register + dark current of a horizontal shift register + increased signal of the vertical shift register). The fact the in the equation shown in Tetsuji, the signal V_2 appear to be added as argued by the Applicant, does not necessarily means that the signal is not subtracted. Note that in the Tetsuji reference, the image signal is being corrected to obtain signal "A" from a signal that corresponds to A + B + C + D + C_1. In order to only obtaining image signal A, the values of signals B, C, D, and C1 must be subtracted from the image signal obtained in region I. Therefore, although the equation used to correct the image signal in Tetsuji appears to be different to the claimed subtraction of the first reference signal in the present application, the Tetsuji reference discloses subtracting the values representative of the signal in the region shielded from light and that does not have photoelectric conversion element. The Examiner also notes that the signal V_1 which is represented by (B + C + D + C_2) can also be represented as (B + V_2) so

that the equation used in Tetsuji can be represented by $A = V - (B + V_2) + V_2 - V_3 = V - B - V_2 + V_2 - V_3$, in which is noted how the signal V_2 is being subtracted from the signal V to cancel said undesired signals to obtain signal A. Also the Examiner noted that in the Shimoyama reference, the first reference signal (output from area of blind pixels BC is being subtracted from the image signal; see col. 4, lines 21-44), which also shows the concept of subtracting the signal obtained from blind pixels from the image signal obtained from an effective image area of the sensor.

➢   The Examiner understands that the Tetsuji reference teaches the limitations as claimed and thus the rejections made to **claims 1 and 9** under 35 USC 103 are maintained.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5.   **Claims 1-4, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art (AAPA) in view of Shimoyama et al., US Patent 5,355,164 and further in view of Tetsuji, JP 4-37166 A.**

Regarding claim 1, AAPA discloses an image sensing apparatus (Fig. 7) using an image sensing element (1a), which has a plurality of pixels arrayed in horizontal and vertical direction, wherein: the image sensing element includes an effective pixel area

(effective area comprising photodiodes 1 as shown in fig. 7) which outputs signal of an

object image, a first reference pixel area which outputs a reference pixel area (signal from

the optical black region 6) which outputs a second reference signal, and wherein a pixel in

the reference pixel area is shielded from light and has a photo-electric conversion element

and outputs a signal including dark current component generated in the photoelectric

conversion element (See AAPA, signals from optical black region 6); said image sensing

apparatus comprising: a correction unit adapted to correct signals of the effective pixel

area while evenly subtracting a representative value based on the second reference signal

(page 1, line 13 – page 5, line 17).

AAPA does not explicitly disclose the claimed first reference signal, that a pixel in

the first reference pixel area is shielded from light and does not have a photoelectric

conversion element, and a correction unit adapted to correct signals of the effective pixel

area based on the first reference signal with respect to each corresponding horizontal line.

However, Shimoyama et al. teaches an image sensing apparatus (Fig. 4) using an

image sensing element (Fig. 4: 1), comprising: a setting device which sets, in one image

signal output from the image sensing element, a signal (effective image signal from region

RP as shown in fig. 5) from a predetermined pixel region, a first reference signal for

correction (from blind pixels BC as shown in fig. 5; col. 3, line 45 – col. 4, line 11), and a

second reference signal (from dummy pixels DC as shown in fig. 5; col. 3, line 45 – col. 4,

line 11); a first correction device which correct the signal from the predetermined pixel

region for each row on the basis of the first reference signal set by said setting device

(Shimoyama et al. teaches performing dark current correction to the image signal based

on the signal values from the blind pixels (Col. 3, line 45 – col. 6, line34)); and a second

correction device which uniformly correct the signals from the predetermined pixel region

on the basis of the second reference signal set by said setting device (Shimoyama et al.

teaches performing dark current correction to the image signal based on the signal values

from the dummy pixels (Col. 3, line 45 – col. 6, line34; see also col. 1, line 54 – col. 2, line

18)). Shimoyama et al. also discloses that although the invention has been described for

a linear sensor, the concepts taught can also be applied to an area sensor (Col. 5, lines

12-16).

Therefore, taking the combined teaching of AAPA in view of Shimoyama et al. as a

whole, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to modify Shimoyama et al. by using a first reference signal for signal

correction, and a correction unit adapted to correct signals of the effective pixel area

based on the first reference signal with respect to each horizontal line in combination with

the correction unit for correcting the image signal (claimed second image signal). The

motivation to do so would have been to accurately correct dark current signals from the

image signal wherein when measurement errors occur in the blind pixels output of a

certain line due to noise, its influences are minimized and streaks can be prevented from

occurring as suggested by Shimoyama et al. (Col. 5, lines 17-34).

Although the combined teaching of AAPA in view of Shimoyama et al. teaches

using a first reference signal for signal correction, and a correction unit adapted to correct

signals of the effective pixel area based on the first reference signal with respect to each

horizontal line in combination with the correction unit for correcting the image signal

(claimed second image signal), the combined teaching of AAPA in view of Shimoyama et al. fails to teach that the first reference pixel area is shielded from light and does not have a photoelectric conversion element; and that said correction unit adapted to correct signals of the effective pixel area corrects the signals based on the first reference signal with respect to each <u>corresponding</u> horizontal line.

However, Tetsuji discloses a solid-state imaging device comprising an effective pixel area (I as shown in fig. 1), a second pixel area shielded from light (II as shown in fig. 1) and a third area comprising the vertical register 12 also shielded from light and that does not have photoelectric conversion elements (III as shown in fig. 1), wherein said second and third areas are used to improve the reliability of the black signals used as a reference to correct the image signal captured by the first pixel area (See English Abstract; see also English Translation, page 6, line 4 – page 7, line 25). Tetsuji further discloses that after calculating output signals of an effective pixel area I (optical signal + dark current of a light receiving portion + dark current of a vertical shift register + dark current of a horizontal shift register + increased signal 1 of the vertical shift register), output signals of an optical black area II whose overall area is shielded from light (dark current of a light receiving portion + dark current of a vertical shift register + dark current of a horizontal shift register + increased signal 2 of the vertical shift register), output signals of an optical black area III which has no light receiving portions with the overall area being shielded from light (dark current of a vertical shift register + dark current of a horizontal shift register + increased signal 2 of the vertical shift register), and output signals of an optical black area IV which has no light receiving portions with the overall area having an

area for the light receiving part opened to let the light hit said area (dark current of a

vertical shift register + dark current of a horizontal shift register + increased signal 1 of the

vertical shift register), Tetsuji teaches that when in operation the signal of a pixel is

corrected by subtracting the noises represented by signals of the areas II, III and IV,

represented as V_1, V_2, and V_3 respectively from the image signal of said pixel, said signal

represented as V, by using the equation $A = V - V_1 + V_2 - V_3$. in said equation the

reference noise signals related to areas II, III and IV from the are subtracted from the

signals of the area I in a way that when reading a particular row, the pixel signals of said

row would have subtracted the reference noise signals of the areas used as a reference

for said row (See English Abstract; see also English Translation, page 6, line 4 – page 7,

line 25). The Examiner understands that since the sensor would read the image signals in

a row-by-row basis, the signal recovery of the image is inherently performed by

subtracting the reference signals with respect to each corresponding horizontal line.

Therefore, the correction unit is adapted to correct signals of the effective pixel area by

subtracting the first reference signal with respect to each corresponding horizontal line

since the reference signals from the portion that is covered and does not have a

photoelectric conversion element (as shown in area III) is subtracted from the image

signals of a pixel in particular row that corresponds to the area used as a reference in the

same row (See English Abstract; see also English Translation, page 6, line 4 – page 7,

line 25).

Therefore, taking the combined teaching of AAPA in view of Shimoyama et al. and

further in view of Tetsuji as a whole, it would have been obvious to one of an ordinary skill

in the art a the time the invention was made to modify AAPA and Shimoyama et al. by having the first reference pixel area shielded from light and does not have a photoelectric conversion element and using said first reference signal for signal correction, wherein the correction unit would be adapted to correct signals of the effective pixel area based on the first reference signal with respect to each corresponding horizontal line. The motivation to do so would have been to improve the reliability of the black signals used as a reference to correct the image signal captured by the effective pixel area.

Regarding claim 2, the combined teaching of AAPA in view of Shimoyama et al. and further in view of Tetsuji as discussed and analyzed in claim 1 teaches that the first reference signal includes a signal free from influence of a signal converted by a photoelectric conversion element of the image sensing element (See Shimoyama et al., signal from blind pixels, Col. 3, line 45 – col. 6, line34; see also col. 1, line 54 – col. 2, line 18), and the second reference signal includes a signal containing a dark current component generated in the photoelectric conversion element of the image sensing element (See AAPA, signals from optical black region 6; Shimoyama et al., signals from dummy pixels DC). Grounds for rejecting claim 1 apply here.

Regarding claim 3, the combined teaching of AAPA in view of Shimoyama et al. and further in view of Tetsuji as discussed and analyzed in claim 1 teaches that the second reference signal includes a signal obtained in a region which includes the photoelectric conversion element in the image sensing element and is shielded from incident light (See AAPA, signals from optical black region 6; Shimoyama et al., signals from dummy pixels DC). Grounds for rejecting claim 1 apply here.

Regarding claim 4, the combined teaching of AAPA in view of Shimoyama et al. and further in view of Tetsuji as discussed and analyzed in claim 1 teaches that the first reference signal includes a signal obtained in a region which does not include the photoelectric conversion element in the image sensing element (See Shimoyama et al., blind pixels BC as shown in fig. 5; col. 3, line 45 – col. 4, line 11). Grounds for rejecting claim 1 apply here.

Regarding claim 9, limitations have been discussed and analyzed in claim 1.

Regarding claim 10, limitations can be found in claim 3.

6.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art (AAPA) and Shimoyama et al., US Patent 5,355,164 in view of Tetsuji, JP 4-37166 A and further in view of Ookawa, US Patent 6,353,223 B1.

Regarding claim 5, the combined teaching of AAPA in view of Shimoyama et al. and further in view of Tetsuji fails to teach that the first reference signal includes a signal output from a reference power supply for each row of the predetermined pixel region.

However, Ookawa teaches the concept of using a voltage source (Fig. 1; 18) as a reference voltage to correct the image signal form noises generated from temperature changes (Col. 1, line 8 – col. 3, line 18).

Therefore, taking the combined teaching of AAPA and Shimoyama et al. in view of Tetsuji and further in view of Ookawa as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify AAPA, Shimoyama et al. and Tetsuji by using a voltage source to supply a reference signal for each row of the

predetermined pixel region. The motivation to do so would have been to correct the image data accordingly to noise changes due to temperature as suggested by Ookawa (Col. 1, line 8 – col. 3, line 18).

7.　　　**Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art (AAPA) and Shimoyama et al., US Patent 5,355,164 in view of Tetsuji, JP 4-37166 A and further in view of Ide at al., US Patent 6,304,292 B1.**

　　　Regarding claim 6, the combined teaching of AAPA in view of Shimoyama et al. and further in view of Tetsuji as discussed and analyzed in claim 1 teaches that the second correction device has a storage device which stores the signal from the effective pixel area (See AAPA, page 2, line 18 – page 3, line 9) but fails to teach a calculation device which calculates a representative value of the second reference signal (optical black signal), and a subtraction device which subtracts the representative value of the second reference signal that is calculated by the calculation device.

　　　However, Ide et al. teaches an imager (See fig. 1: 12 and fig. 10), comprising an optical black detection area (See fig. 10) and an effective pixel area (See fig. 10), wherein the signal values from the optical black detection area are averaged by a clamp level calculation circuit (Fig. 9: 50) and the averaged values of the signals from the optical black detection area are subtracted for the image signal (Col.6, line 53 – col. 7, line 36; col. 9, line 14 – col. 10, line 31).

Therefore, taking the combined teaching of AAPA and Shimoyama et al. in view of

Tetsuji and further in view of Ide et al. as a whole, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to modify AAPA, Shimoyama et

al. and Tetsuji by having a calculation device which calculates a representative value of

the second reference signal (optical black signal), and a subtraction device which

subtracts the representative value of the second reference signal that is calculated by the

calculation device. The motivation to do so would have been to prevent the black level

deviation from occurring as suggested by Ide at al. (Col. 2, lines 52-63).

Regarding claim 8, limitations can be found in claim 6.

8.   **Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over**

Applicant Admitted Prior Art (AAPA) and Shimoyama et al., US Patent 5,355,164 in

view of Tetsuji, JP 4-37166 A and further in view of Abe, US Patent 6,700,609 B1.

Regarding claim 7, the combined teaching of AAPA in view of Shimoyama et al.

and further in view of Tetsuji fails to teach that the calculation device has a calculation

device which calculates representative values of the second reference signal for a plurality

of regions obtained by dividing the region which includes the photoelectric conversion

element in the image sensing element and is shielded from incident light, and a device

which outputs to the subtraction device a lowest value among the representative values of

the plurality of regions that are calculated by the calculation device.

However, Abe teaches an imaging apparatus (Fig. 3), comprising an image sensor

(Fig. 3: 1), said image sensor comprising an optical black region (Fig. 1: 21), wherein said

optical black region is divided into a plurality of regions (every line has a black portion

which is compared to other black portion of the adjacent lines, this teaches dividing the

black region into a plurality of black portions), and wherein the vale of the black region

corresponding to a line is compared to another black region corresponding to an adjacent

line to find an absolute difference between the values (this is read as a representative

value), wherein the absolute difference is compared to a predetermined value and if the

absolute value is lower that the predetermined value, said absolute value would be used

to correct the image signal by sending the average clamp level to a subtracter to subtract

it from the image signal and if is larger than the predetermined value the clamp level

would be updated (Col. 3, line 60 – col. 5, line 48).

Therefore, taking the combined teaching of AAPA and Shimoyama et al. in view of

Tetsuji and further in view of Abe as a whole, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to modify AAPA, Shimoyama et

al. and Tetsuji by having a calculation device which calculates representative values of the

second reference signal for a plurality of regions obtained by dividing the region which

includes the photoelectric conversion element in the image sensing element and is

shielded from incident light, and a device which outputs to the subtraction device a lowest

value among the representative values of the plurality of regions that are calculated by the

calculation device. The motivation to do so would have been to improve the image

sensing apparatus by correcting the dark current for each row thus flicker is avoided as

suggested by Abe (Col. 6, lines 9-24).

Conclusion

9.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until

after the end of the THREE-MONTH shortened statutory period, then the shortened

statutory period will expire on the date the advisory action is mailed, and any extension

fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory

action. In no event, however, will the statutory period for reply expire later than SIX

MONTHS from the mailing date of this final action.

Contact

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Nelson D. Hernández Hernández whose telephone

number is (571)272-7311. The examiner can normally be reached on 9:00 A.M. to 5:30

P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Lin Ye can be reached on (571) 272-7372. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published

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<div style="text-align:right">

Nelson D. Hernández Hernández
Examiner
Art Unit 2622
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NDHH
November 7, 2008

<div style="text-align:center">

/Lin Ye/
Supervisory Patent Examiner, Art Unit 2622
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